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EXHAUST EMISSION ANALYSIS OF TWO WANKEL-POWERED CARS FURNISHED BY THE U.S. ARMY TANK/AUTOMOTIVE COMMAND

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Ann Arbor, Michigan

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16. Abstracts

Two Wankel-powered passenger cars were purchased by the U.S. Army to evaluate the rotary engine for military application. The evaluation includes driveability, fuel economy, exhaust emissions, and durability. This report deals with the emissions measurement portion of the evaluation. The test cars were the Mazda R100 with a 60 cu. in. rotary engine, and the NSU Ro80, with a 995 cc rotary engine. Testing was accomplished using the 1975 Federal Test Procedure with the inertia set at 2250 lbs. for the Mazda and 3000 lbs. for the NSU. Test data, which is tabulated, indicate that more tests should have been run to provide a solid baseline from which to begin the 50,000-mile durability. None of the tests approach 1975 or 1976 required levels. However relatively low levels of oxides of nitrogen were achieved

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Background

The U.S. Army has purchased two Wankel-powered passenger cars to evaluate the rotary engine for military application. The evaluation will include driveability, fuel economy, exhaust emissions, and durability.

EPA was asked to provide the emissions measurement portion of the evaluation.

Vehicles Tested

The test cars were the Mazda R100, with a 60 cu. in. rotary engine, and the NSU Ro80, with a 995 cc rotary engine. Both vehicles were received in stock condition.

Test Program

Testing was accomplished using the 1975 Federal Test Procedure (3-bag) with the inertia set at 2250 lbs for the Mazda and 3000 lbs. for the NSU.

Instrumentation was as specified in the Federal Register. Constant Volume Sampler (CVS) bag samples were analyzed for unburned hydrocarbons (HC) with a FID, for CO and CO_2 with NDIR, and for nitrogen oxides (NOx) with chemiluminescence (CL).

An attempt was made to measure hydrocarbons (HC) using a heated FID but numerous equipment malfunctions precluded this type of measurement.

Test Results

The emission results are presented in the Appendix of this report. None of the tests approach 1975 or 1976 required levels. However, relatively low levels of oxides of nitrogen were achieved.

Conclusion

To provide a solid baseline from which to begin the 50,000-mile durability, several more tests should have been run. However, there is a wealth of data available on the Mazda rotary through the certification testing. The short time alloted for testing precluded multi-baseline runs.

Closer repeatability might have been achieved if the tests had been run back to back eliminating the variables of delayed testing.

APPENDIX

Cold Start 1975 FTP
(all results in grams per mile)

MAZDA

	HC	CO	CO_2	NOx
Test #1 8-23-72	7.56	41.87	506.32	1.26
Test #2 8-28-72	4.70	24.48	576.42	1.25

Calculated Fuel Consumption 14.6 mpg

NSU

	HC	CO	CO_2	NOx
Test #1 8-23-72	9.03	57.50	499.52	1.44
Test #2	7.03	35.08	529.54	1.70

Calculated Fuel Consumption 14.9 mpg